

## REMARKS

Claims 1, 10, 11, and 15 have been amended herein. Support for the recitation "wherein the catalyst is present in the reaction in a catalyst-to-reactant molar ratio of about 0.10 or less" claims can be found in the specification at page 5, lines 10-11 (0.033 mmol catalyst ÷ 0.33 mmol amine or amide = 0.1); at page 5, lines 1-2 (0.017 mmol catalyst ÷ 0.33 mmol amine or amide = 0.052); and at page 4, lines 21-22 (0.017 mmol catalyst ÷ 0.83 mmol amine = 0.021). No new matter is added.

Claim 19 was cancelled earlier pursuant to a restriction requirement.

Claims 1-18 remain active in the case. Favorable reconsideration is respectfully requested.

**Rejection of Claims 1-18 Under 35 USC §103(a) Over Bon et al. (1994) *J. Org. Chem.* 59:4035-4036, U.S. Patent No. 5,395,974 to McKinney, and U.S. Patent No. 5,587,498 to Krogh et al.:**

This rejection is believed to have been overcome, in part, by appropriate amendment to the claims, and is, in part, respectfully traversed.

The crux of the present invention is that the catalyst is, in fact, a catalyst (rather than a promoter). The present claims positively require that the catalyst be present in the reaction in an amount that is less than stoichiometric with the reactants. Thus, in the claims as amended, the method is positively recited as requiring a catalyst-to-reactant ratio of about 0.1 or less.

This is distinctly different from the combination of Bon et al., McKinney, and Krogh et al. Specifically, Bon et al. take great care not to identify the aluminum chloride described therein as a "catalyst." In fact, the very title of the Bon et al. paper, "Aluminum Chloride-Promoted Transamidation Reactions" (emphasis added) makes clear that Bon et al. is not using the aluminum chloride in a catalytic sense. More to the point, Bon et al. explicitly note that their interest was "to examine the activation of amides by complexation with [a] Lewis acid." See page 4035 of Bon et al, left-hand column, second full paragraph. Thus, Bon et al. use aluminum chloride not in catalytic amounts, but in excess.

In particular, all of the experiments run by Bon et al. use aluminum chloride at a molar equivalent ratio of 1.3 or 2.3 (catalyst-to-reactant). See all of the entries of Tables 1 and 2 of Bon et al., the fourth column in each table. Thus, Bon et al. do not use the aluminum chloride in a catalytic sense. In short, Bon et al. do not describe or suggest using a metal-containing catalyst, in an aromatic, aprotic solvent, to drive a transamidation or amide metathesis reaction, wherein the catalyst is present in the reaction in a catalyst-to-reactant molar ratio of about 0.10 or less.

The shortcomings of the Bon et al. primary reference are not cured by combining Bon et al. with the McKinney patent and the Krogh et al. patent. The combination still does not teach or suggest the presently claimed invention.

The reaction described by McKinney, for example, is neither a transamidation reaction nor an amide metathesis reaction, as required by the present claims. The reaction described by McKinney is a lysis reaction: a polyamide reactant (different types of nylon) are lysed into various monomers, in the presence of ammonia. See McKinney at col. 1, lines 39-45. Because the reaction described by McKinney is neither a transamidation reaction nor an amide metathesis reaction, there is no motivation to combine McKinney with Bon et al. in the first instance.

But even when combined with Bon et al., the combination of Bon et al. and McKinney still does not teach using an aromatic, aprotic solvent, as required by the present claims. This is not a question of optimizing a solvent. One cannot "optimize" a variable that is entirely absent. That is, Bon et al. use dichloroethane as a solvent. (See footnote 13 of Bon et al.) McKinney et al. does not use a solvent at all. Thus, in the combination of Bon et al. with McKinney et al., dichloroethane is the only solvent mentioned (in the Bon et al. paper). Dichloroethane is not an aromatic solvent, which is required by the language of the claims as amended. McKinney is simply silent on the matter. (See McKinney's examples, beginning at col. 4, line 15.) Going to the three-way combination of Bon et al., McKinney and Krogh et al., does not add any further teaching or suggestion because Krogh et al. also does not use a solvent. In the full, three-way combination of references (taken in any combination, or singly), dichloroethane is the only

solvent mentioned. The present claims, however, positively require using a aromatic, aprotic solvent.

This rejection is traversed because the Krogh et al. patent is totally and completely unrelated to the present technology. Therefore there is simply no technological motivation whatsoever to combine Krogh et al. with the other two references because Krogh et al. describes a condensation reaction between an amine and a carboxylic acid. In contrast, the present claims are drawn to methods for transamidation reactions or amide metathesis reactions.

In particular, see the paragraph spanning columns 2 and 3 of the Krogh et al. patent:

Likewise, in a preferred embodiment, the amine is selected from the group consisting of ammonia, primary amines, and secondary amines. The carboxylic reactant is selected from the group consisting of  $\alpha$ -mono- and disubstituted carboxylic acids.

Most telling, however, are Krogh et al's examples, which clearly demonstrate that the Krogh et al. reaction is a vapor-phase condensation reaction (and not a transamidation or amide metathesis equilibrium reaction). Krogh et al's Example 1 is illustrative, starting at col. 5, line 30. After loading a high-pressure reaction vessel with an amine, a carboxylic acid, and a catalyst (no solvent is used), the vessel was sealed and heated to 220-250°C for 15 hours. (The pressure reached 300 psi.) When the reaction was complete, Krogh et al. explicitly state "The contents [of the vessel] were then cooled, the pressure vented, and the water of reaction was vacuum stripped." The Krogh et al. patent thus describes a vapor-phase condensation reaction, a reaction that is distinct from, and irrelevant to, the amide metathesis and transamidation reactions recited in the present claims.

Applicants therefore submit that the §103 rejection over Bon et al, McKinney, and Krogh et al. is improper because there is no motivation to combine Krogh et al. with Bon et al. and McKinney.

To summarize, the three-way combination of Bon et al. with the McKinney patent and the Krogh et al. patent does not teach or suggest the positively recited invention because Bon et al. does not use the aluminum chloride described therein in a catalytic

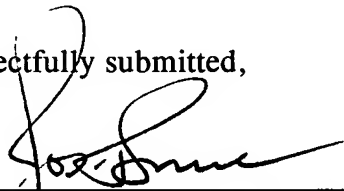
fashion, and neither of the two secondary references even describe the type of reaction positively recited in the present claims. The only reference that describes a transamidation reaction is Bon et al, and Bon et al. use an aluminum chloride promoter in excess of stoichiometric quantity with respect to the reactants. In contrast, all of the presently pending claims require a metal-containing catalyst to be present at a catalyst-to-reactant molar ratio of about 0.10 or less.

Applicants therefore submit that the rejection of Claims 1-18 under §103(a) in view of Bon et al., McKinney, and Krogh et al. is improper. Withdrawal of the same is respectfully requested.

### CONCLUSION

In light of the above amendment and remarks, Applicants submit that the application is now in condition for allowance. Early notification of such action is earnestly solicited.

Respectfully submitted,

  
**Joseph T. Leone, Reg. No. 37,170**  
DEWITT ROSS & STEVENS S.C.  
8000 Excelsior Drive, Suite 401  
Madison, Wisconsin 53717-1914  
Telephone: (608) 831-2100  
Facsimile: (608) 831-2106

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